EVALUATION OF AN 'ANTI-FOGGING' SWIMMERS' FACE MASK

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14 SEPTEMBER 1959

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ABSTRACT

An "Anti-Fogging" Face mask was evaluated to determine its effectiveness in reducing face mask fogging. No noticeable improvement in this respect over ordinary face masks was found.

SUMMARY

PROBLEM:

Does the "anti-fogging" face mask developed at the U.S. Navy Underwater Sound Laboratory effectively reduce fogging?

FINDINGS:

No noticeable reduction in fogging was found.

RECOMMENDATIONS:

It is recommended that the "anti-fogging" face mask not be accepted for use in the U.S. Navy.

ADMINISTRATIVE INFORMATION

Ref: (a) Fonecon, LCDR Searle, EDU to M. J. Foran, BuShips of 29 September 1958

An "anti-fogging" face mask was submitted to the Experimental Diving Unit for evaluation in September 1958. The face mask was developed at the U. S. Navy Underwater Sound Laboratory, New London, Connecticut.

Reference (a) assigned the project number. Work commenced on 1 October 1958 and was completed 24 March 1959. The following is a breakdown of the manhours expended for this project:

DESCRIPTION	MANHOURS
Testing	40
Report Preparation	10
Clerical services	6
TOTAL	56

This is the first report on this project number. It is issued in the Evaluation Report series and is issued only to the Bureau of Ships. Further distribution must be authorized by the Bureau of Ships. Expenses incident to this project were lodged against allottment 16102/59.

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1. INTRODUCTION

1.1 Background

1.1.1 In September, 1958, an "anti-fogging" face mask was received from the U.S. Navy Underwater Sound Laboratory, New London, Connecticut. The face mask was developed to reduce the fogging of a diver's face mask due to the condensation of moisture on the inner surface of the glass.

1.2 Objective

1.2.1 The objective of this evaluation was determine whether the anti-fogging face mask is effective in reducing fogging of divers' face masks.

1.3 Scope

1.3.1 This evaluation was limited to use of the anti-fogging mask by swimmers in water of different temperatures. No laboratory tests were conducted.

2. DESCRIPTION

2.1 General

2.1.1 The anti-fogging face mask is an ordinary swimmers' face mask which has been modified. The single glass face piece found in ordinary masks has been replaced by a layer of two pieces of glass, separated by five black threads, running horizontally across the face piece. The purpose of the threads is to provide an insulating space between the panes of glass.

2.1.2 Two pieces of brass have been bolted onto the inside of the face mask, one on each side of the face mask. The bolts extend through the mask and are in contact with the water when the swimmer is underwater. The purpose of the brass is to provide a cold surface inside the mask, on which the moisture can condense.

2.2 Principle of Operation

2.2.1 The insulating space between the panes of glass is designed to keep the inner pane of glass at a higher temperature than the surrounding water. The pieces of brass are in contact with the surrounding water via the bolts which hold them in place. The brass should therefore, remain at a temperature near that of the surrounding water.

2.2.2 With the brass at a lower temperature than the inner pane of the face piece, moisture should condense on the brass before it does on the face piece. The humidity of the air in the mask should then be lowered, reducing the possibility that moisture will condense on the face piece.

3. PROCEDURE

3.1 Subjective Evaluation

3.1.1 The anti-fogging face mask was worn on various types of dives and swims, in place of the ordinary swimmers' face mask. The water temperature

encountered in most of the dives was relatively warm, ranging from 65 to 80°F. A few dives were made in arctic waters, with the water temperature at 28°F and the air temperature 20 to 40°F.

4. RESULTS

4.1 Routine Dives

4.1.1 The divers who used the anti-fogging face mask in water temperatures from 65 to 80°F reported that fogging of the face mask was experienced unless the inner pane of the face mask was smeared with saliva prior to the dive. No marked difference was found with respect to fogging between the anti-fogging mask and the ordinary masks.

4.1.2 The black threads in the face piece were not found to be objectionable. No interference with vision was reported.

4.1.3 The added weight due to the addition of the brass cooling surfaces was noticeable and was reported to be objectionable in some cases.

4.2 Arctic Dives

4.2.1 In the Arctic dives, the divers wore special wet suit hoods which covered a large portion of the face. The first effect upon entering the water was the freezing of a thin coating of ice on the exterior of the mask, due to the low air temperatures above water. After the ice melted from the face piece, very little fogging of the face piece resulted. Similar results were obtained, however, when the ordinary face mask was worn. This was attributed by the personnel making the test to the face that there was very little area of the face exposed, resulting in little transfer of body heat to the air in the mask.

5. DISCUSSION

5.1 Principle of Operation

5.1.1 The principle of operation on which the anti-fogging face mask is based appears to be sound. The reduction of fogging which was expected, however, did not occur in the test dives.

5.1.2 It may be that the size of the brass pieces is insufficient to condense enough of the moisture to prevent fogging. Another possibility is the fact that when air is exhaled into the mask to equalize pressure (or accidentally), the warm humid air strikes the face piece before coming into contact with the brass pieces.

5.2 Problem of Fogging of Face Masks

5.2.1 When a face mask is worn in water of almost any temperature normally encountered, fogging of the inside of the face piece occurs unless the face piece is smeared with an anti-fogging substance such as saliva, tooth paste, or tabacco prior to the dive. Smearing the face piece with saliva prior to a dive is the most widely practiced means of preventing fogging and it is reasonably effective.

5.2.2 A way of removing condensed moisture from the inside of the face piece is to keep a little water in the face mask and allow this water to wash over the surface of the face piece when it becomes fogged. This results in a uniformly wet face piece, which is transparent and allows good vision through the face piece. If this technique is used, the problem of a fogged face piece is not a serious one.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 The principle on which the anti-fogging face mask is based is good.

6.1.2 The anti-fogging face mask does not result in a noticeable reduction in fogging.

6.1.3 The problem of fogging of face masks is not a serious one.

6.1.4 The anti-fogging face mask is objectionably heavy.

6.2 Recommendations

6.2.1 It is recommended that the anti-fogging face mask not be accepted for use in the U. S. Navy.